

Restructuring Science, Technology and Mathematics (STM) Education for a Viable Entrepreneurship

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Abstract: *The continued existence of poverty, high rates of crimes, unemployment and other social problems are indicators which shows that the aims of education generally has not been achieved. This paper discusses the need to restructure Science education to reflect entrepreneurship so that we can hopefully have graduates that can be self-reliant. This is because the present science education has not achieved its aim of making graduates self-reliant. Entrepreneurship education, if introduced into science education will produce graduates who can effectively manage private businesses. In this paper, the concept of entrepreneurship education was explained and advantages, challenges and solution to the problems militating against entrepreneurship education were outlined. The paper also gave an insight into what science education will look like when entrepreneurship education is included into secondary school curriculum. This situation applies to the aspects of science education. Suggestions and recommendations were also forwarded.*

Keywords: *Science Education, Entrepreneurship and self-reliant*

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I. Introduction

Nigeria is underdeveloped because her citizens are still mentally and economically colonized. Political upheavals, economic depression, and unemployment have frustrated development in Nigeria. It is hopeful that a lasting solution to these problems would be achieved through education. Many people have defined education as the process individuals undergo through the acquisition of knowledge, skills abilities and attitudes that are necessary for effective living in the society. It then follows that education should prepare people to be enterprising as they may be employees and entrepreneurs/employers. In Nigeria today, the above-named definition of education is farfetched. Graduates find it very difficult and impracticable to get jobs. Industrial work experience scheme, which was introduced by the National Policy on Education, has not helped the graduates to be self-employed or employable. There is an urgent need to overhaul our educational system. To this end, Science education should be able to solve the problem. It is supposed to provide the basic tools for industrialization and national development (Maduabum, 1999). It should bring economic and social development by providing employment and improve the welfare of the recipients (Aguale&Agwagah, 2007). It should foster the students' habit of scientific attitudes and help them to acquire skills of constructive reasoning, effective mental activity, and imaginative thinking. It is only science education that can help Nigerian youths become confident and disposed to survive the harsh social and economic conditions of our times. The question is: Has Science education been able to achieve its objectives? The obvious answer is "No" Because according to Ayogu (2007), science education has a lot of problems in Nigeria. Some of the problems are:

(1) Lack of policy implementation guidelines: This means that there are no specific steps in the policy to actualize its objectives, which stated that there should be well-trained and well-motivated teachers

(2) Resources:

(a) Human resources: Science teachers are inadequate in Nigerian schools so also trained laboratory technologists and laboratory attendants:

(b) Material resources: Most of the schools do not have well equipped laboratories. Improvised materials are also lacking.

(3) Attitude to work: Nigerian teachers are poorly motivated and salaries are paid irregularly. This gives rise to poor teaching, indiscipline on the part of teachers and the students, examination malpractices, and failure in external examinations.

(4) Administrative problems: Administrative problems are hindrance to advancement in science education. Most policies are hardly implemented. Those in-charges of education are not science-inclined and so they show no interest in science issues.

(5) Inadequate funding: Education budget is usually low and not much is given to science education. This has negatively affected the teaching and learning in schools as well as research and laboratory activities.

(6) Corruption: Dishonesty, laziness, bribery, embezzlement, and looting of public fund meant for science education.

In view of the problems stated above, STM education in Nigeria has failed in achieving its objectives. It is then penitent that STM education should be restructured towards entrepreneurship education. This means that a cash-productive education should be introduced to make for maximum self-development and self-fulfillment (Iloputaife, 2002).

What Is Entrepreneurship Education?

Entrepreneurship comes from a French word entrepreneur; means to undertake, i.e., one who undertakes to supply goods or services to the market for profit (Onyenyi, 2003). Leebaert (1990) defined entrepreneurship as a process of organizing, managing, and assuming risk of a business. Butter (1990) defined the entrepreneur, as one who manages and takes the risks of business enterprise. It is, therefore, the process of owning and managing a business enterprise with the hope of making profit. Entrepreneurs invest their own capital in a business and take the risks associated with it. Entrepreneurship elements are combination of motivation, vision with judgment, communication, determination, optimism, courage, endurance, and the power of creating corporation, which finds market opportunities (Bolarinwa, 2001). Ojukwu (2001) described entrepreneurship development as a programme of human capital development inputs aimed at increasing the supply of adequately trained entrepreneurs who are motivated to make a success out of a business. Entrepreneurship education is defined by Bolarinwa (2001) as education that provides training, experience, and skills that are suitable for entrepreneurial endeavors. Entrepreneurship education should, therefore, prepare graduates with entrepreneurial knowledge, competence, and skills needed for self-reliance. Ashomre (1989) stated that entrepreneurship education offers students opportunity to anticipate and respond to changes. Iloputaife (1997; 2002) stated that functionality in education (entrepreneurship in STM education) would serve to:

- (1) Identify students that possess entrepreneurial traits;
- (2) Motivate and develop students for launching and managing their own small-scale business enterprises;
- (3) Create necessary awareness and motivation in students for promoting self-employment and alternatives to wage empowerment. Odo (2001) stated three benefits of entrepreneurship as follows:
 - (1) It fosters economic growth;
 - (2) It increases productivity; and
 - (3) It creates new technologies, products, and services.

OBJECTIVES OF ENTREPRENEURSHIP EDUCATION

The objectives for Entrepreneurship Education include but not limited to the following:-

1. Identify and solve problems using critical and creative thinking.
2. Examine the link between Science, Vocational and Technical education, small business and entrepreneurship.
3. Organize and manage oneself and one's activity.
4. Develop the spirit of creativity, logical thinking, self-reliance, independence and freedom of making one's own decision.

Advantages of Entrepreneurship Education

According to Bolarinwa (2001), entrepreneurship education has the following advantages:

- (1) It will help the students to form a base of knowledge about the function and operation of a business and develop some level of familiarity and comfort with business environment, since technology changes micro-enterprises;
- (2) It will play as a complementary role in developing the occupational knowledge, job skills, and work experience;
- (3) It offers opportunities to students for job experience and for earning, saving, and investing money at an earlier stage of life than their peers, contributing to their belief in their abilities and a sense of self-worth;
- (4) There will be a great reduction in the high rate of unemployment in the society and self-employment, and business ownership will become viable and appealing goals for today's students. The Science education has failed in its responsibilities of fostering scientific skills and attitudes as the graduates roam the streets with no job and no skill to start off their own business. Therefore, there is the need to restructure the science education for entrepreneurship. There is also the need to introduce into the school curriculum entrepreneurship education

for the acquisition of right habits, attitudes, and skills as a means of surviving in the face of unemployment. In fact, there should be total overhaul of Science education in Nigeria. A new curriculum for Science education should be developed and various sectors like the Nigerian Business Educators Association, Chamber of Commerce and Industries, Manufacturers Association of Nigeria, etc., should be included in the formation of the new curriculum. The society, the schools, the students, the trade associations, and club and business owners should be included in the development of the course contents. The course contents should reflect the local labor markets and the students' needs.

According to Ilopu taife (2002) Science education should include in its objectives:

- (1) Taking up employment in industries and factories requiring their areas of specialization;
- (2) Providing employment for self and others;
- (3) Being computer literate and being able to service and maintain computers.

STM education classroom should reflect business sessions. Electrical applications like locally made torch lights that could be constructed for sale. Detergents, simple torch light, magnets, telescope, simple transformer, two tone door bell, etc., could be made and sold to make money. Dyes, colorings, and spices could be produced by students for sale. There should be a Shop in each institution to sell students' products. Seminars, workshops on starting a business, small business management, profit utilizations, personnel administration, etc., can be organized for both teachers and students.

There should be a way of rewarding the students and the teachers from the yields realized from the ventures. This will increase their enthusiasm and enhance their interest. At least, they will experience profit making. Students should be imparted with open mindedness, intellectual honesty, love of God, and love of their neighbours. Most products to be made and sold should come from the local environment, which differs from school to school. The various levels of government should fund Science education to ensure a successful, fruitful, and result-oriented education. Science education should also inculcate values, such as punctuality, regularity, tenacity to work, and reward for merit.

Challenges of Entrepreneurial Education

1. Inconsistency in Policy Implementation:

Science education polices may not be implemented, supervised, and evaluated by the relevant government tofficials.

2. Poor Laboratories and Facilities:

Unqualified instructors/teachers, inadequate instructional equipment/materials, and lack of properly equipped laboratories may hinder the progress of entrepreneurial education.

3. Inadequate Fund:

There may not be enough funds to provide the necessary materials needed for the programme. This may be as a result of poor allocation of fund to education sector. Non-payment of teachers' salaries or science teachers' allowances or even promotion of teachers can result in low morale on the part of the teachers who may not like to take up extra job resulting from entrepreneurship.

Solution to the Problems Militating Against Entrepreneurial Science Education:

The solutions to the problems militating against entrepreneurial Science education are as follows:

- (1) policies as specified in the national policy on education must be implemented, supervised, and evaluated by those concerned with science education. The development of intellectual, manipulative, social, and other skills that will ensure self-fulfilled and self-reliant citizens should be the watchword;
- (2) Properly equipped laboratories must be provided in schools. These laboratories should have enoughequipment, materials, and even improvised materials;
- (3) Laboratory technologists, technicians, and laboratory assistances should be provided and re-trained inimprovisation;
- (4) Adequate fund should be allocated to education especially to Science education. Teachers' salaries andscience allowances should be paid on time. Some of the money generated from the sales of the products shouldbe given to the students and the teachers to sustain their interest.

Insight into Issues that can be solved Using physics as Example

Curriculum designed for physics education in tertiary institutions should include courses in restructuring science, technology and mathematics for entrepreneurships.

For the SSS (senior secondary school) physics, the following should be included:

(1) For SS 1:

- Meaning of entrepreneurship;
- Basic elements of entrepreneurship;
- Characteristics of entrepreneurship;
- Key steps to entrepreneurship;

- Causes and remedies of entrepreneurship failure.

(2) For SS 2:

- Laws and procedures relating to registering a small business;
- Sources of fund for financing small-scale business;
- Small business management-principles and application;
- Profit utilization and credit and debit management;
- Computer/information processing and international business.

(3) For SS 3:

- Seminars and Workshops on entrepreneurship;
- Management of the school shop;
- Production and selling of items produced during practical.

The SS 3 students can be able to produce the following items during practical's:

- Locally made torch-light;
- Making magnets by electrical/rubbing method;
- Making reflector/simple mirror;
- Locally made weighing machine;
- Telescope;
- Pressure (simple bicycle) pump;
- Simple transformer;
- Inverter used for converting DC to AC
- Light emitting diode (LED) used for commercial advertisement;
- Burglar alarm system;
- Two tone door-bell;

II. Suggestions and Recommendations

Science education should be diversified, made more functional, and geared towards solving the problems of contemporary society. To this end, it should be restructured to reflect entrepreneurship so that the graduates should be self-reliant, empowered, and self-employed. Hence, Science education should be a priority in Nigerian system to ensure a successful, fruitful, and result-oriented entrepreneurship education. Teachers' pre-service and in-service workshops and seminars should be organized.

Values, such as punctuality, regularity to work, honesty in sales, reward for merit, and other attitudes that will enhance productivity and promote orderly societal growth should be enforced.

Science laboratories that will produce the products to be sold should be stocked with equipment and materials.

Practical lessons should be geared towards production of materials for sale to the college communities and outside the college environment.

Financial support, training and facilities need to be provided in order to ensure the graduates active participation.

There should be advertisement units to advertise the products to the public. If these suggestions and recommendations are made and implemented, Science education will surely transform the society and ensure rapid development of the nation.

III. Conclusions

Entrepreneurship is the hub of national development and Science education should form the base. Nigeria should therefore gear towards functional entrepreneurial education through diversified entrepreneurial Science curriculum. Science education should be diversified and made functional than its present status. It should be geared towards solving the problems of our contemporary society. To this end, Science education must be re-structured to include entrepreneurship. Science education classroom should be business like to ensure education for work, and employment and education for self-reliance.

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